Paper No. 17

UNITED STATES PATENT AND TRADEMARK OFFICE

_____

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

_____

Ex parte GIJSBERT W. LOKHORST,
ROBERT M. FRITZCHE, and RONALD B. WHEELOCK

_____

Appeal No. 2001-2568
Application No. 09/178,848

_____

ON BRIEF

_____

Before KRATZ, TIMM, and PAWLIKOWSKI, Administrative Patent Judges.

PAWLIKOWSKI, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1 through 19, which are all the claims pending in this application.

The subject matter on appeal is represented by claim 1, set forth below:

1. A method of fabricating a lead frame which comprises the steps of:

(a) providing an electrically conductive layer having a pair of opposing major surfaces;

(b) first etching a pattern in said electrically conductive layer extending partially through said electrically conductive layer to form cavities with sidewalls in said electrically conductive layer;

(c) providing a patterned mask on said electrically conductive layer, said patterned mask masking said sidewalls; and

(d) then again etching said layer within said cavities, said sidewalls not being etched due to said patterned mask masking said sidewalls in said cavities.

The references relied upon by the examiner as evidence of unpatentability are:

Ohsawa et al. (Ohsawa)	5,221,428	June 22, 1993
Fogelson	5,454,905	Oct. 3, 1995
Liou et al. (Liou)	5,847,460	Dec. 8, 1998

Claims 1 and 9 stand rejected under 35 U.S.C. § 103 as being unpatentable over Fogelson in view of Liou.

Claims 2 through 8 and 10 through 19 stand rejected under 35 U.S.C. § 103 as being unpatentable over Fogelson in view of Liou and further in view of Ohsawa.

Opinion

For the reasons set forth in the Brief and Reply Brief, and below, we reverse each of the above noted rejections.

I. The rejections of claims 1 and 9 under 35 U.S.C. § 103 as being unpatentable over Fogelson in view of Liou.

The examiner relies upon Fogelson for teaching a method for manufacturing a fine-pitch lead frame and states that Fogelson teaches that a region of a metal layer is etched optionally from both sides to a fraction of its original thickness after which leads are formed both in the etched and non-etched regions. The examiner states that Fogelson

further teaches that the lead formation is accomplished by applying a mask over both the etched and non-etched regions which would mask part of the sidewalls and etching through the layer to form leads. (Answer, page 3). The examiner further states that Fogelson teaches that a metal layer is etched to a fraction of its original thickness and that therefore Fogelson teaches first etching a pattern in the layer extending partially through the layer. The examiner states that because the layer is etched, it is inherent that cavities with sidewalls are formed in the layer. The examiner states that a mask is then applied over the etched and non-etched regions of the layer thereby masking at least part of the sidewalls the mask having openings in the shape of the fine pitch leads and a second etch is performed. On page 4 of the Answer, the examiner states that Fogelson does not teach that during the second etching of the cavities, the cavity sidewalls are masked. The examiner relies on Liou for teaching masking the cavity sidewalls with further etching then taking place with the cavity sidewalls masked. (Answer, page 4). The examiner concludes it would have been obvious to one of ordinary skill in the art to use the sidewall's basic formation method of Liou to prevent the sidewalls of Fogelson from being etched.

We note that appellants make issue in connection with an amendment made after final and state that the amendment add nothing to the claim, however, the examiner still saw fit to add Liou as a reference and change the rejection from a 102 to a 103 despite the fact that the claim had not been changed in a material sense. We note that this is a petitional matter and we need not comment on it.

At the bottom of page 4 of the Brief, appellants state that there is nothing in Fogelson that teaches or even remotely suggests a subsequent masking of the cavity sidewalls with further etching then taking place with the cavity sidewalls masked.

We find that Fogelson conducts a first etching step to etch region 30 as shown in Figure 2a. This is described at column 5 at lines 6 through 8. The creation of etched region 30 allows for the creation of fine pitch lead tips 42 that can approach a smaller die pad area 72. See column 5, lines 30 through 34. These fine pitch lead tips 42 are illustrated in Figure 5b. Once the etched region 30 is formed the fine pitch lead tips 42 and the thicker base leads can be formed. As shown in Figures 5a and 5b the fine pitch lead tips 42 and the thicker base leads 112 can be made by utilizing tapered fine pitch stamped tool punches 180. See column 5, lines 55 through 59. Alternatively a

second etching may be employed to create the fine pitch lead tips 42. See column 6, lines 18 through 20. By placing a mask in the shape of a fine pitch lead frame over the etched metal strip 38 and etching away the slots 114. Fine pitch lead tips 42 can thus be created in the same form as the earlier embodiments. As with stamping the second etching can achieve a finer pitch than conventionally frames due to the smaller thickness of the etched area. See column 6, lines 21 through 26. This disclosure tells us that fine pitch lead tips 42 can be formed by etching but in no way is it indicated that the sidewalls are protected by the mask when the etching is conducted. Hence we agree with appellants' interpretation of Fogelson. The examiner also recognizes this deficiency in Fogelson.

On page 8 of the Answer, the examiner states that in Liou, a sidewall space or film is deposited over the pads and insulative layer. A spacer is known in the semiconductor industry to be a mask that masks sidewalls in a cavity. Part of the spacer film is removed, however the sidewalls are still masked by the film, as shown in Figs. 4 and 5A of Liou. The examiner relies upon this disclosure for the teaching of masking sidewalls during a second etched step.

We find, however, that the examiner has not explained the motivation to incorporate the sidewall spacers disclosed in Liou into the masking step performing the fine lead tips 42 of Fogelson. At the bottom of page 4 of the Answer the examiner states that it would have been obvious to use a sidewall spacer formation method of Liou to prevent the sidewalls of Fogelson from being etched in that one of ordinary skill in the art would want to prevent the sidewalls from being etched in Fogelson in order to create cavities having dimensions smaller that the dimensions of what can be printed with modern photolithography equipment. However, the idea in Fogelson to form fine pitch lead tips 42 is so that one can approach a smaller die pad area 72 as pictured in Figure 5b. The examiner has not explained how the utilization of sidewalls of Liou would achieve this end. In this context we agree with appellants' comments made on page 2 of the Reply Brief that Liou has nothing whatsoever to do with the problem involved or its solution (minimization of undercutting or underetching). Appellants state that there is no two-step etch process of the type set forth in the claims herein. Appellants state that it is difficult to reason how two reference neither of which has anything to do with a problem to be solved or its solution can be properly combined. We must agree. We further note

that Liou is directed to formation of small geometry vias and contacts of a semiconductor device structure, as pictured, for example, in Figure 5a of Liou. Furthermore, Liou describes Figure 2 having an insulating layer 16 which is etched to form opening 20. The opening is preferably etched by an anisotropic etch to form substantially vertical sidewalls at the edges of opening 20. See column 4, lines 31 through 38. Referring to Figure 3, photoresist layer 18 is removed and a sidewall spacer film 22 is formed over insulating layer 16 and in opening 20. Sidewall spacer film 22 may be any suitable material which may be selectively etched over the insulating layer 16, for example, polysilicon or nitride. See column 4, lines 45 through 52. The examiner has not explained why one of ordinary skill in the art would incorporate this particular kind of sidewall spacer film into the invention of Fogelson. Furthermore, appellants' claims require in step (c) of providing a patterned mask on the electrically conductive layer, said patterned mask masking said sidewalls. Claim 2 requires that this patterned mask is a liquid photo resist. This is directly contrary to the kinds of materials utilized by Liou.

In view of the above, we reverse the rejections.

II. The rejection of claims 2 through 8 and 10 through 19 under 35 U.S.C. § 103 as being unpatentable over Fogelson in view of Liou and further in view of Ohsawa.

In light of the fact that we reversed the rejection of claims 1 and 9 under 35 U.S.C. § 103 as being unpatentable over Fogelson in view of Liou, we also reverse this rejection because Ohsawa does not cure the aforementioned deficiencies of Fogelson in view of Liou.

III. Conclusion

Each of the art rejections is reversed.

REVERSED

PETER F. KRATZ Administrative Patent Judge	)
CATHERINE TIMM Administrative Patent Judge	) BOARD OF PATENT) APPEALS AND
BEVERLY A. PAWLIKOWSKI Administrative Patent Judge	) INTERFERENCES

Jay M. Cantor
Texas Instruments Incorporated
P.O. Box 655474, M/S 3999
Dallas, TX 75265